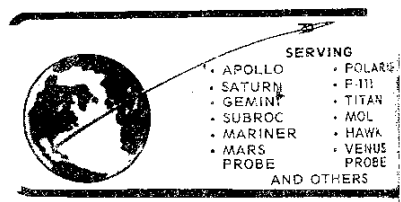


Balco Capacitors
div of Balco Electronics
from: EEM 1969

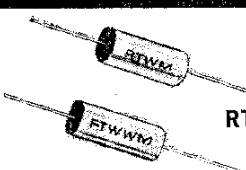

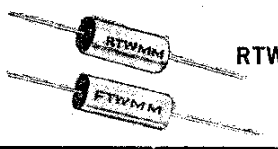




HELLCAP

"WRAP AND FILL" CAPACITORS

FILM WRAP EPOXY END SEAL CONSTRUCTION

- SMALLEST SIZE
- EXCEPTIONAL PERFORMANCE
- LOW COST
- FAST DELIVER

	TEMP. RANGE	MFD. RANGE	VOLTAGE RANGE	DISSIPATION FACTOR	INSULATION RESISTANCE	% Δ C / °C TEMP.
 <p>MYLAR TYPES RTWM (TUBULAR) AND FTWWM (FLAT)</p>	-60°C TO +125°C (50% Derating Above 100°C)	.0047 TO >1.0	TO >600 VDC	1.0% MAX. AT 1KC & 25°C	1x10 ⁵ MEGS MIN. AT +25°C	-4.0% MAX 25°C TO -55°C +15.0% MAX 25°C TO 125°C
 <p>POLYSTYRENE TYPE RTWP (TUBULAR)</p>	-60°C TO +85°C (Without Derating)	.001 TO >.47	TO >600 VDC	0.05% MAX. AT 1KC & 25°C	5x10 ⁵ MEGS MIN. AT +25°C	-105 PPM/°C ±30
 <p>METALIZED MYLAR TYPES RTWMM (TUBULAR) AND FTWMM (FLAT)</p>	-60°C TO +125°C (50% Derating Above 100°C)	.01 TO >5.0	TO >600 VDC	1.0% MAX. AT 1KC & 25°C	3x10 ⁴ MEGS MIN. AT +25°C	-4.0% MAX 25°C TO -55°C +15.0% MAX 25°C TO 125°C
 <p>METALIZED POLYCARBONATE TYPE RTWKM (TUBULAR)</p>	-60°C TO +125°C (Without Derating)	.01 TO >5.0	TO >600 VDC	0.5% MAX. AT 1KC & 25°C	1x10 ⁴ MEGS MIN. AT +25°C	+1.5% MAX 25°C TO -55°C ±1.5% MAX 25°C TO 125°C
 <p>HIGH TEMPERATURE (150°C)* TEFLON† TYPE RTWG (EXTENDED FOIL) & METALIZED TEFLON† (TYPE RTWGM) *SPECIALS TO +175°C</p>	-60°C TO +150°C (Without Derating)	.001 TO >.15 .047 TO >4.0	TO >600 WVDC TO 600 WVDC	.1% MAX. AT 25°C .15% MAX. AT 25°C	5 x 10 ⁵ MEGS MIN AT +125°C 1 x 10 ⁴ MEGS MIN. AT +25°C	±1.5% MAX 25°C TO -55°C AND 125°C -150 PPM/°C MAX.

FOR FLAT TYPES REFER TO PREFIX F--ADDITIONAL INFORMATION AVAILABLE ON REQUEST.

PAGE 7 FOR COMPLETE SPECIFICATIONS, INCLUDING DIMENSIONS, REQUEST BROCHURE NO. TW-68
MAIN PLANT: 307 WASHINGTON STREET, ORANGE, NEW JERSEY 07050, TEL. (201) 677-1200
 620 See YELLOW SECTION for Local Offices, Phones

Datasheet from
www.33audio.com

Metal Can
Hermetically Sealed



EEM 1969

PROCESSED TEFLON+ CAPACITORS

TEMP. RANGE: -70°C to 200°C WITHOUT DERATING (SPECIALS TO 250°C)

- LOW TEMPERATURE COEFFICIENT
- LOW DISSIPATION FACTOR
- HIGHEST INSULATION RESISTANCE
- LOW DIELECTRIC ABSORPTION
- SUBMINIATURE SIZE
- MIL-C-19978C TYPES AVAILABLE
- HIGH STABILITY

HT SERIES (EXTENDED FOIL)—HIGHEST INSULATION RESISTANCE

HT series capacitors exhibit the highest insulation resistance obtainable in the present state of the art (to $>10^{14}$ ohms** min. for the HT-3). Other outstanding characteristics include dissipation factor $<0.02\%$, dielectric absorption $<0.03\%$, and low capacitance variation with temperature. For detailed performance characteristics of the basic (HT-2) type, and for higher performance types (HT-3 to HT-9) available—see tables and chart, this page.

LV, LZ SERIES—MINIATURE/LOW VOLTAGE VERSIONS OF HT SERIES

Series LV (50 WVDC) and LZ (15 WVDC) capacitors are designed to occupy minimum physical volume, while retaining most of the excellent electrical characteristics of the HT series. For detailed performance characteristics of the basic (LZ-4 and LV-4) types, and for higher performance types (LZ-5, 8, & 9 and LV-5, 8, & 9) available—see tables and chart, this page.

PHT SERIES—PRECISION/HIGH STABILITY EXTENSION OF HT SERIES

PHT series capacitors are specially processed to obtain very high stability (retrace $<0.2\%$ †, and low capacitance variation with temperature (see table at right). For detailed performance characteristics of the basic (PHT-2) type, and for higher performance types (PHT-3 to PHT-9) available—see tables and chart, this page.

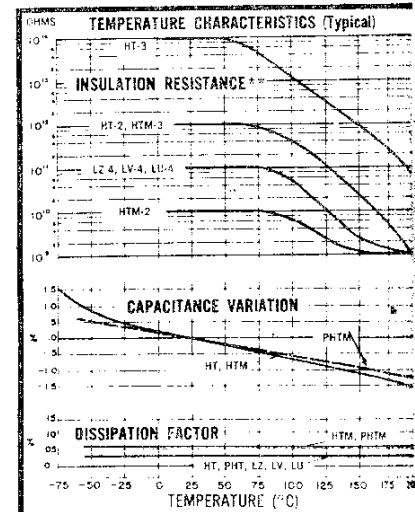
HTM SERIES (METALIZED)—HIGH STABILITY AND SUBMINIATURE SIZE

HTM series capacitors offer very low temperature coefficient (approx. -70 PPM/°C) and high insulation resistance (to $>10^{12}$ ohms** for the HTM-3), in addition to extremely small physical size. For detailed performance characteristics of the basic (HTM-2) type, and for higher performance types (HTM-3 to HTM-9) available—see tables and chart, this page.

PHTM SERIES—PRECISION/LINEAR T.C. EXTENSION OF HTM SERIES

PHTM series capacitors exhibit ultra-stable retrace ($<0.02\%$ ‡) and a low linear temperature coefficient (-70 PPM/°C ± 30)†, supplementing the excellent characteristics of the HTM series. For detailed performance characteristics of the basic (PHTM-2) type and for higher performance types (PHTM-3 to PHTM-9) available—see tables and chart, this page.

For Dimensions and Ordering
Information of All Types—
Refer to Balco Page 4



** Approx. Min. values shown, in ohms to 1.0 MFD; ohms x MFD above 1.0 MFD

BASIC CAPACITOR CHARACTERISTICS (TYPICAL)					
BALCO SERIES	HT	LV, LZ	PHT	HTM	PHTM
TEMP. COEFF. (neg.) OR % ΔC vs TEMP. (Max. Approx.)	1.0%, RT to 150°C 1.5%, RT to 200°C 1.5%, RT to -70°C		1.0% RT to 160°C RT to -60°C	-70 PPM/°C [‡] (approx.)	-70 PPM/°C [‡] ± 30 (Most sizes)
RETRACE (After Temp. Cycling†)	$<0.3\%$ (HT-6)	$<0.3\%$ LV-6, LZ-6	$<0.2\%$ (PHT-6)	$<0.1\%$ (HTM-6)	$<0.02\%$ (PHTM-6)
DISSIPATION FACTOR (at 25°C & 1000 CPS)	$<0.02\%$	$<0.02\%$	$<0.02\%$	$<0.1\%$	$<0.05\%$
DIELECTRIC ABSORPTION (at 25°C)	$<0.03\%$	$<0.03\%$	$<0.03\%$	$<0.03\%$	$<0.03\%$
INSULATION RESISTANCE ** (Min. at 25°C)	1×10^{12}	1×10^{11}	1×10^{12}	1×10^{13}	1×10^{13}
TOLERANCES TO:	1/2%	1/2%	1/4%	1/4%	1/10%

† Over restricted temperature ranges

** IN OHMS TO 1.0 MFD; OHMS X MFD ABOVE 1.0 MFD

HIGHER PERFORMANCE TYPES AVAILABLE						
Char. No.	Additional Performance Over the Basic	HT	HTM	LV	PHT	PHTM
-2	BASIC	HT-2	HTM-2	—	PHT-2	PHTM-2
-3	Basic + Hi. I.R. (a)	HT-3	HTM-3	—	PHT-3	PHTM-3
-4	Basic + Sm. Size (b)	HT-4	HTM-4	LZ-4	PHT-4	PHTM-4
-5	Basic + Hi. I.R. + Sm. Size	HT-5*	HTM-5	LZ-5*	PHT-5	PHTM-5
-6	Basic + Hi. Stab. (c)	HT-6	HTM-6	LZ-6	PHT-6	PHTM-6
-7	Basic + Hi. I.R. + Hi. Stab.	HT-7	HTM-7	—	PHT-7	PHTM-7
-8	Basic + Sm. Siz. + Hi. Stab.	HT-8	HTM-8	LZ-8	PHT-8	PHTM-8
-9	Basic + Hi. I.R. + Sm. Siz. + Hi. Stab.	HT-9*	HTM-9	LZ-9*	PHT-9	PHTM-9

* Available in most capacity and voltage ratings

† DuPont Reg. Trademark

PAGE 1

MAIN PLANT: 307 WASHINGTON STREET, ORANGE, NEW JERSEY 07050. TEL: (201) 677-1200



Balco Marstan 1972

305 Washington St Orange, New Jersey 07050

Precision Film Capacitors

Every Balco capacitor is manufactured under exacting controls and standards, which have been proven effective through participation in virtually every major missile and space program. The exceptional quality of these components is confirmed by rigorous electrical and mechanical inspections performed at various stages of production on each order.

Balco/Marstan specializes in the design of ultra precision film capacitors wire wound resistors and networks — resistive, capacitive, or RC. Special designs for the user who needs a combination of parameters, such as high stability, low temperature coefficient, and close tolerances over a wide range of environmental extremes.

DIELECTRIC SELECTOR GUIDE

The following chart lists typical specifications:

Precision and stability factors can be improved by special processing of materials before assembly.

PARAMETER	TEFLON		POLYCARBONATE		POLYSTYRENE		MYLAR	
	Extended Foil HT	Metalized Film HTM	Extended Foil KT	Metalized Film KTM	Extended Foil PT	Metalized Film PTM	Extended Foil QT	Metalized Film QTM
Capac. Range (μ F)	0.001-2.0	.05 to 4.0	.01 to 5.0	.05 to 20.0	.001 to 10.0	.01 to 20.0	.05 to 2.0	.01 to 20.0
Working Volt. (Vdc)	50 to 600	50 to 600	30 to 600	30 to 600	100 to 600	100 to 600	50 to 600	50 to 600
Stability (retrace after temperature cycling, %)	<.10	<.05	<.10	<.10	<.05	<.05	<.5	<.3
Temperature Coefficient	-100 \pm 70 PPM/ $^{\circ}$ C	-90 \pm 30 PPM/ $^{\circ}$ C	< \pm 100 PPM/ $^{\circ}$ C	< \pm 100 PPM/ $^{\circ}$ C	-120 \pm 30 PPM/ $^{\circ}$ C	-120 \pm 30 PPM/ $^{\circ}$ C	+3% to 85 $^{\circ}$ C +15% to 125 $^{\circ}$ C	+3% to 85 $^{\circ}$ C +15% to 125 $^{\circ}$ C
Insulation Resistance (@ 25 $^{\circ}$ C Ω)	>10 ¹²	>10 ¹⁰	>10 ¹¹	>10 ¹⁰	>10 ¹²	>10 ¹⁰	>10 ¹¹	>3 x 10 ¹⁰
Dissipation Factor @ 25 $^{\circ}$ C and 1 kHz (%)	<.02	<.10	<.10	<.50	<.02	<.05	<.60	<1.0
Dielectric Absorption @ 25 $^{\circ}$ C (%)	<.03	<.03	<.50	<.50	<.05	<.05	<0.5	<0.5
Operating Temp. Range ($^{\circ}$ C)	-55 to +200	-55 to +200	-55 to +125	-55 to +125	-55 to +85	-55 to +85	-55 to +125	-55 to +125
Tolerances								
Standard	5%	5%	5%	5%	5%	5%	5%	5%
Precision	.25%	.25%	.50%	.5%	.10%	.5%	.50%	.50%

The above dielectrics exhibit the best characteristics in hermetically sealed cases, however they may be supplied in other encasements at slightly reduced sizes, costs and electrical parameters.

Balco/Marstan brings together the precision capacitor experience of Balco Capacitors and the precision resistor capability of Marstan Electronics.

Our unique side by side resistor and capacitor processing ensures the ultimate in component compatibility and overall network performance. Resistors and capacitors can be precisely matched to track over wide temperature ranges.

Typical Networks Manufactured by Balco/Marstan:

- Matched impedance Attenuators
- Summing Networks
- Integrators
- Voltage Dividers
- Phase Shifters
- Binary Resistance Networks
- Twin T Networks
- Bridges
- A/D and D/A Converters
- Timing Networks

For Precision Resistors see pages 3270 and 3271; for Precision RC Networks see page 1497.

Balco Marstan 1972
Precision Film Capacitors
Hermetically Sealed Metal Can



HT TEFLON & FOIL					
MFD	50 VDC	100 VDC	200 VDC	400 VDC	600 VDC
.001	—	—	.235 x 3/4	.235 x 3/4	.235 x 3/4
.005	—	.235 x 1	.312 x 7/8	.400 x 1 1/8	.400 x 1 1/8
.01	—	.312 x 7/8	.312 x 1	.400 x 1 1/8	.400 x 1 1/8
.022	.312 x 7/8	.312 x 1 1/8	.400 x 1 1/8	.500 x 1 1/8	.500 x 1 1/8
.05	.312 x 1 1/4	.400 x 1 1/8	.500 x 1 1/8	.562 x 1 1/2	.562 x 1 1/2
.10	.400 x 1 1/8	—	.670 x 1 1/8	.750 x 1 1/2	1 x 2
.25	—	—	.750 x 2	1 x 1 1/8	1 1/8 x 2
.50	—	—	1 x 2	1 1/8 x 1 1/8	—
1.00	—	—	2 x 2 x 1 1/8	—	—

HTM METALIZED TEFLON					
MFD	50 VDC	200 VDC	400 VDC	600 VDC	800 VDC
.05	.235 x 1 1/8	.312 x 1 1/8	.400 x 1 1/8	.500 x 1 1/8	.670 x 1 1/8
.10	.312 x 1 1/8	.400 x 1 1/8	.500 x 1 1/8	.670 x 1 1/8	.750 x 1 1/8
.25	.400 x 1 1/8	.500 x 1 1/8	.670 x 1 1/8	.750 x 1 1/8	.875 x 1 1/8
.50	.500 x 1 1/8	.562 x 1 1/8	.875 x 1 1/8	1.0 x 1 1/8	1.0 x 1 1/8
1.0	.500 x 1 1/8	.750 x 1 1/8	1.0 x 1 1/8	1.375 x 1 1/8	1.375 x 1 1/8
2.0	.670 x 1 1/8	1.0 x 1 1/8	1.375 x 1 1/8	—	—
4.0	.875 x 2 1/8	1.375 x 1 1/8	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—

KT POLYCARBONATE & FOIL					
MFD	50 VDC	100 VDC	200 VDC	400 VDC	600 VDC
.01	.312 x 3/4	.312 x 3/4	.312 x 1.00	.312 x 1 1/8	—
.022	.312 x 7/8	.312 x 7/8	.312 x 1.00	.400 x 1 1/8	—
.05	.312 x 7/8	.400 x 7/8	.400 x 1 1/8	.500 x 1 1/8	—
.10	.400 x 7/8	.400 x 1 1/8	.500 x 1 1/8	.562 x 1 1/8	—
.25	.400 x 1 1/8	.500 x 1 1/8	.670 x 1 1/8	.670 x 1 1/8	—
.50	.500 x 1 1/8	.562 x 1 1/8	.750 x 1 1/8	.750 x 1 1/8	—
1.0	.670 x 1 1/8	.750 x 1 1/8	.750 x 1 1/8	1.00 x 1 1/8	—
2.0	—	—	1.00 x 1 1/8	—	—

KTM METALIZED POLYCARBONATE					
MFD	50 VDC	100 VDC	200 VDC	400 VDC	600 VDC
.05	.235 x 3/4	.312 x 3/4	.312 x 7/8	.400 x 1.0	—
.10	.312 x 3/4	.312 x 7/8	.400 x 7/8	.500 x 1.0	—
.22	.312 x 7/8	.400 x 1.0	.400 x 1 1/8	.562 x 1 1/8	—
.33	.400 x 7/8	.400 x 1.0	.400 x 1 1/8	.562 x 1 1/8	—
.47	.400 x 1.0	.500 x 1.0	.500 x 1 1/8	.670 x 1 1/8	—
1.0	.500 x 1.0	.562 x 1 1/8	.562 x 1 1/8	.875 x 1 1/8	—
2.0	.670 x 1 1/8	.670 x 1 1/8	.670 x 1 1/8	1.0 x 2 1/8	—
4.0	.750 x 1 1/8	.750 x 1 1/8	.875 x 1 1/8	—	—
5.0	.750 x 1 1/8	.750 x 1 1/8	1.0 x 1 1/8	—	—
10.0	.875 x 1 1/8	1.0 x 2 1/8	1.25 x 2 1/8	—	—

PT POLYSTYRENE & FOIL					
MFD	100 VDC	200 VDC	400 VDC	600 VDC	800 VDC
.001	.235 x 7/8	.235 x 7/8	.235 x 7/8	.235 x 1.0	.235 x 1.0
.006	.235 x 7/8	.312 x 7/8	.400 x 7/8	.400 x 1.0	.400 x 1.0
.010	.235 x 1.0	.312 x 1.0	.400 x 1.0	.400 x 1 1/8	—
.022	.312 x 1.0	.400 x 1.0	.500 x 1 1/8	.500 x 1 1/8	—
.05	.400 x 1.0	.500 x 1 1/8	.562 x 1 1/8	.670 x 1 1/2	—
.10	.500 x 1.0	.670 x 1 1/8	.750 x 1 1/8	.875 x 1 1/2	—
.25	.670 x 1 1/8	.875 x 1 1/2	1.25 x 1 1/2	1.375 x 1 1/2	—
.50	.750 x 1 1/8	1.0 x 1 1/8	1.375 x 1 1/8	—	—
1.0	2 x 2 x 1 1/8	2 x 2 x 1 1/8	—	—	—
2.0	2 x 2 x 2 1/8	2 x 2 x 2 1/8	—	—	—
5.0	2 x 2 x 5	2 x 2 x 5	—	—	—
10.0	3 1/2 x 3 x 3 1/2	3 1/2 x 3 x 3 1/2	—	—	—

PTM METALIZED POLYSTYRENE					
MFD	100 VDC	200 VDC	400 VDC	600 VDC	800 VDC
.01	.235 x 7/8	.235 x 1.0	.312 x 1.0	.312 x 1 1/8	—
.022	.235 x 7/8	.312 x 1.0	.400 x 1 1/8	.400 x 1 1/8	—
.05	.312 x 1.0	.400 x 1 1/8	.500 x 1 1/8	.562 x 1 1/2	—
.10	.400 x 1.0	.562 x 1 1/8	.670 x 1 1/8	.750 x 1 1/2	—
.25	.562 x 1 1/8	.750 x 1 1/2	1.00 x 1 1/8	1.25 x 1 1/8	—
.50	.670 x 1 1/8	.875 x 1 1/2	1.25 x 1 1/8	—	—
1.0	.875 x 1 1/8	1.0 x 1 1/8	—	—	—
2.0	2 x 2 x 1 1/8	2 x 2 x 1 1/8	—	—	—
5.0	2 x 2 x 5	2 x 2 x 5	—	—	—
10.0	—	3 1/2 x 3 x 3 1/2	—	—	—
20.0	—	3 1/2 x 6 1/8 x 3 1/2	—	—	—

QT MYLAR & FOIL					
MFD	50 VDC	100 VDC	200 VDC	400 VDC	600 VDC
.01	.235 x 3/4	.235 x 3/4	.235 x 1.0	.235 x 1 1/8	.312 x 1 1/8
.022	.235 x 7/8	.235 x 7/8	.312 x 7/8	.312 x 7/8	.400 x 1 1/8
.05	.235 x 7/8	.312 x 7/8	.312 x 1 1/8	.400 x 1 1/8	.500 x 1 1/8
.10	.312 x 7/8	.312 x 1 1/8	.400 x 1 1/8	.500 x 1 1/8	.670 x 1 1/8
.25	.312 x 1 1/8	.400 x 1 1/8	.562 x 1 1/8	.670 x 1 1/8	.750 x 1 1/8
.50	.400 x 1 1/8	.500 x 1 1/8	.750 x 1 1/8	.750 x 2 1/8	1.0 x 2 1/8
1.0	.562 x 1 1/8	.670 x 1 1/8	.750 x 2 1/8	1.25 x 1 1/8	1.375 x 2 1/8
2.0	—	—	1.25 x 1 1/8	—	—

QTM METALIZED MYLAR					
MFD	50 VDC	200 VDC	300 VDC	400 VDC	600 VDC
.05	.235 x 7/8	.235 x 1.0	.312 x 1.0	.400 x 7/8	.400 x 1 1/8
.10	.235 x 7/8	.312 x 1.0	.400 x 1.0	.400 x 1 1/8	.500 x 1 1/8
.25	.312 x 1.0	.400 x 1.0	.400 x 1 1/8	.500 x 1 1/2	.562 x 2 1/8
.50	.400 x 1.0	.400 x 1 1/8	.500 x 1 1/2	.562 x 1 1/8	.750 x 2 1/8
1.0	.400 x 1 1/8	.500 x 1 1/2	.562 x 1 1/8	.750 x 1 1/8	1.0 x 2 1/8
2.0	.500 x 1 1/8	.562 x 1 1/8	.750 x 1 1/8	1.0 x 1 1/8	—
4.0	.670 x 1 1/8	.750 x 1 1/8	1.0 x 1 1/8	—	—
5.0	.670 x 1 1/8	.750 x 2 1/8	1.25 x 1 1/8	—	—
10.0	.750 x 2.0	1.0 x 2 1/8	—	—	—

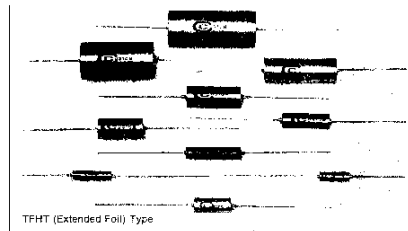
Datasheet from www.33audio.com

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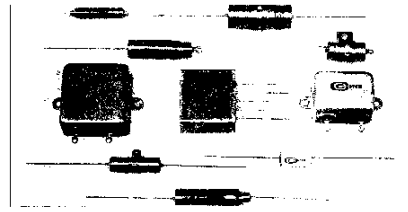


Custom Balco 1978
Electronic Buyers Guide

TFHT
Film/Foil



TMHT
Metallized



Electrical Ratings
 Capacitance Range: 0.000 μ f to 4.0 μ f
 Capacitance Tolerance: ± 0.25 to $\pm 20\%$
 Voltage Range: 50 WVDC to 600 WVDC
 Temperature Coefficient: -90 ± 40 ppm/ $^{\circ}$ C — Metallized Film
 -100 ± 100 ppm/ $^{\circ}$ C — Extended Foil
 Dissipation Factor: 0.10% max. @25 $^{\circ}$ C — Metallized Film
 0.02% max. @25 $^{\circ}$ C — Extended Foil

STANDARD SERIES
made of
DuPont TEFLON[®]

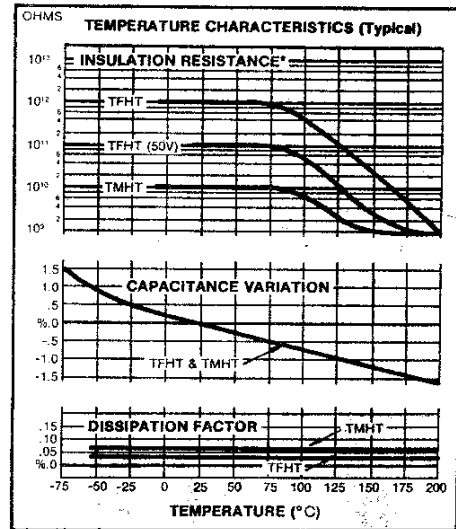
**For High Insulation Resistance on
High Temperature Applications**

Standard series capacitors of DuPont TEFLON[®] offers you an ultrastable, low loss, low temperature coefficient capacitor that is ideally suited for high insulation resistance requirements up to 200 $^{\circ}$ C (Specials to 250 $^{\circ}$ C).

Two different internal construction styles are offered to the circuit design engineer: **Extended Foil** - for use in high power resonant and pulse circuits. **Metallized Film** - for resistor coefficient matching and for use in subminiature circuits.

Standard leads are tinned copper-clad steel. Tubular cases are brass - 100% tinned.

Custom has what design engineers need . . . Depend on it. For **FREE** Facilities Brochure and Balco Product Bulletin T-1, write or call:



* (Approx. Min. values shown, in ohms to 1.0MFD; ohms, MFD above 1.0MFD)

CUSTOM ELECTRONICS, Inc.
 4 Browne St., Oneonta, N.Y. 13820
 Ph: (607) 432-3880 TWX: 520-241-8292